NetAct Cloud

NETACT CLOUD 22

On VMware

TECHNICAL SOLUTION DESCRIPTION

Version 01

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Summary of changes

Version	Date (dd.mm.yyyy)	Author	Description of Change
01	29.05.2022	Barznj Maarouf Abdullah	Initial Draft
1.1	07.06.2022	Barznj Maarouf Abdullah	NMS AS (VM47) resource added

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1 Introduction

1.1 Purpose

This document provides information about the NetAct Cloud on VMWare proposed to Telecom Operator. It gives the high-level and low-level design description of the NetAct Cloud system.

NetAct Cloud is the Network Management System (NMS) designed and developed by Telecom Vendor. It is used to monitor, control, analyze and manage telecommunication networks.

Nokia is Telecom Vendor which supplies Telecom Solutions

The solution is based on Cloud VMware where NetAct Virtual Machines will be installed on Telecom Operator Data Center.

1.2 Audience

The main audience of this document are product managers, solution managers, customer data center teams and other personnel that need information on the NetAct system.

1.3 Scope

Following provides the scope for this project

a. Deployment of Production NetAct

b. Integration of Network Elements

c. UAT

d. Hand Over

1.4 Design decisions

ID	Area	Description
DD-01	Deployment	Deploy NetAct Cloud as standalone site
DD-02	Size & Version	Install small NetAct 22 Cloud on VMware with latest SP package

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DD-03	Backups	Image backups of NetAct VMs will be managed by Customer backup system.
DD-04	Trial System	This NetAct delivery is Proof Of Concept only
DD-05	No DB Flashback	DB Flashback is not considered in this POC delivery

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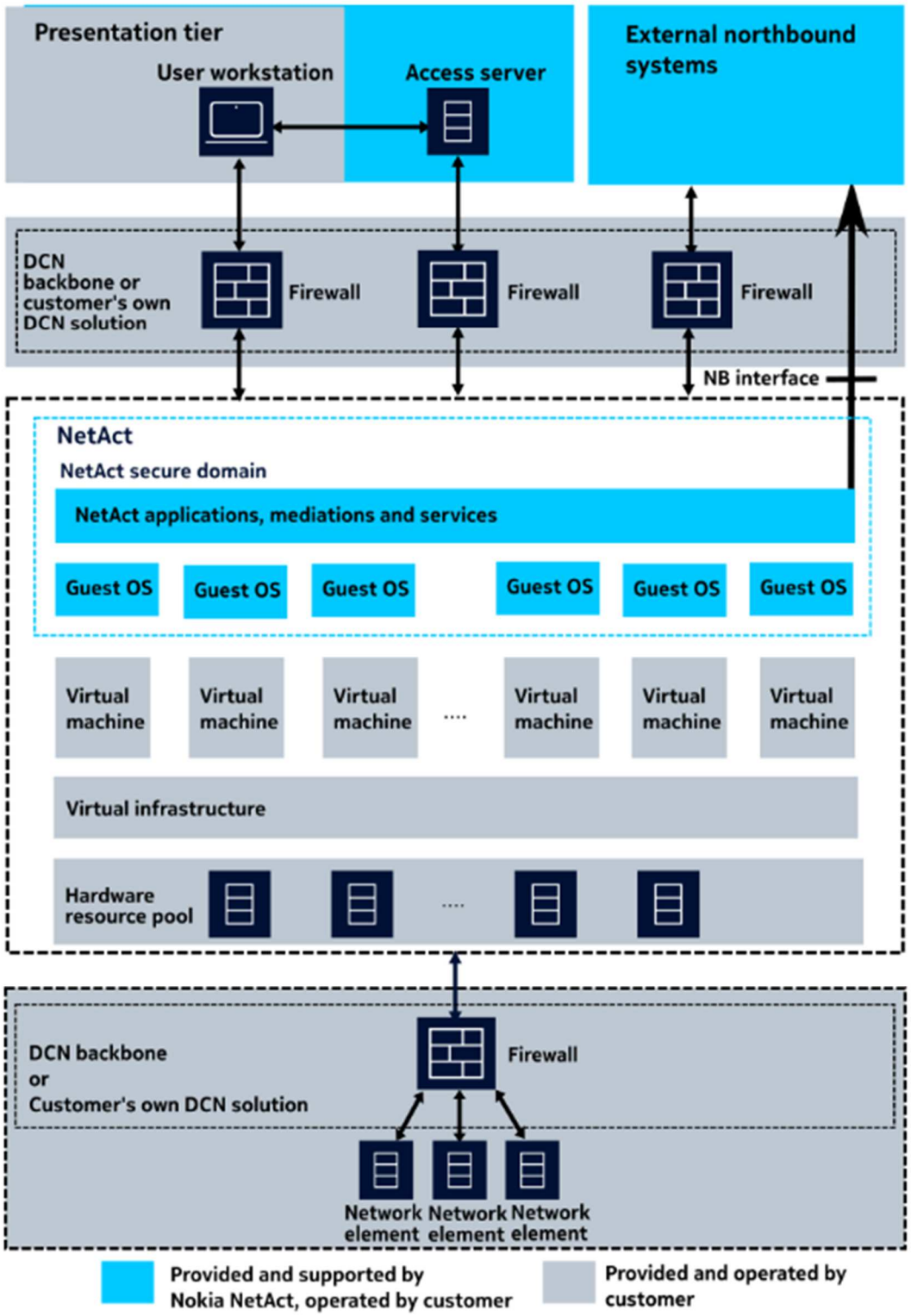
2 NetAct system

2.1 NetAct Virtualized Architecture



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2.2 NetAct Functional Architecture

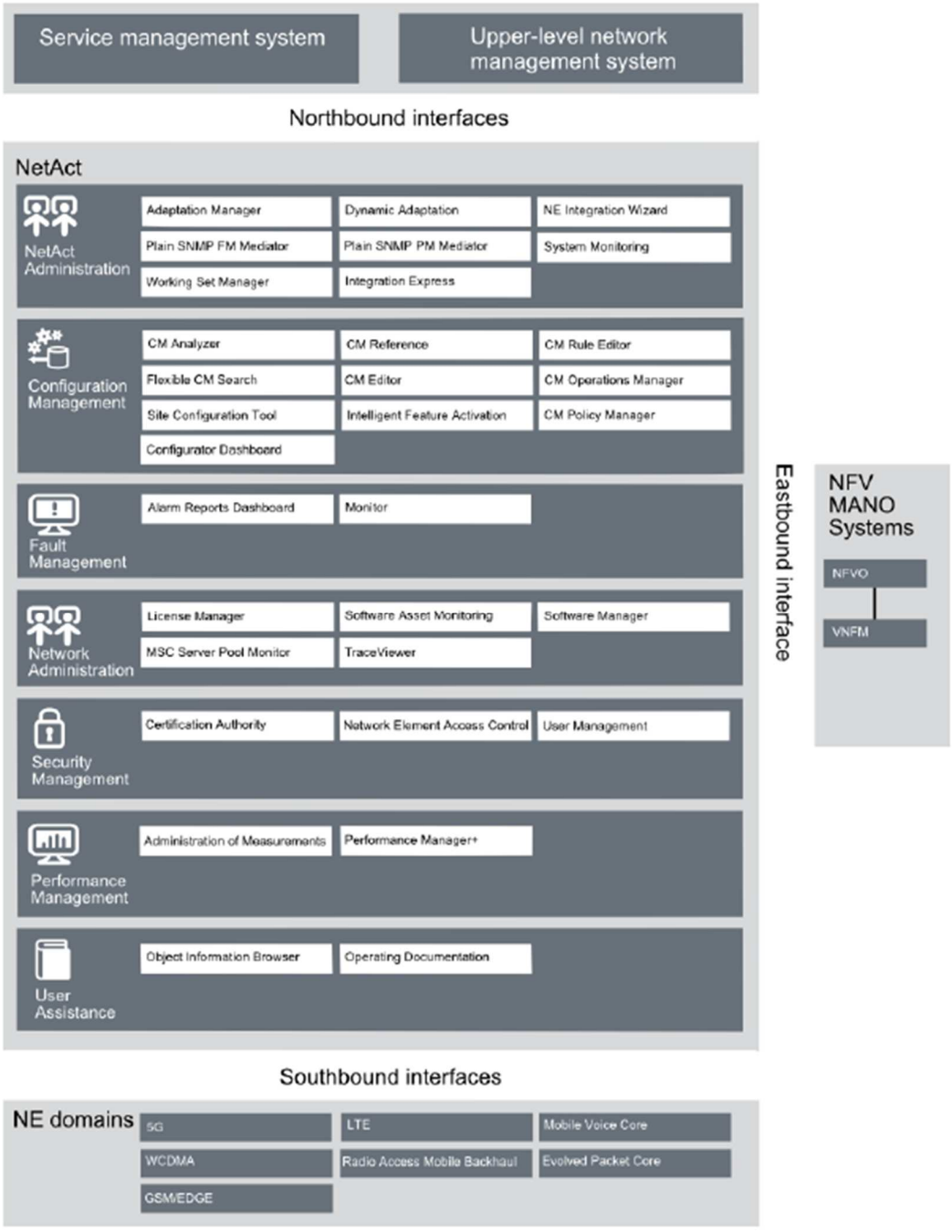

Figure 1: NetAct Functional architecture

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Management function	NetAct application	Function description	NetAct Start Page folder
Fault Management	Alarm Reports Dashboard	Manages reports for Fault Management.	Monitoring
Fault Management	Monitor	Monitors the network and provides access to further tools.	Monitoring
Configuration management	CM Analyzer	Checks parameter consistency.	Configuration
Configuration management	CM Editor	Edits configuration parameter data.	Configuration
Configuration management	CM Operations Manager	Manages provisioning and upload operations.	Configuration
Configuration management	CM Reference	Manages reference configurations.	Configuration
Configuration management	CM Rule Editor	Creates user-defined rules in a simple way.	Configuration

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Configuration management	Configurator Dashboard	Can be used for managing and verifying configuration operations and data.	Configuration
Configuration management	Flexible CM Search	Searches configuration management data in the actual configuration.	Configuration
Configuration management	Site Configuration Tool	Manages repository for the site configuration data.	Configuration
Configuration management	Intelligent Feature Activation	A web-based tool for fast and easy activation of new radio features.	Configuration
Configuration management	CM Policy Manager	Checks the consistency of planned configurations against a predefined policies just before plan provision. Blocks plan provision if any violations are reported for the planned configuration.	Configuration
Performance management	Administration of Measurements	Configures measurements for network elements or managed objects.	Reporting

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Management function	NetAct application	Function description	NetAct Start Page folder
Performance management	Performance Manager+	Monitors and reports the performance of telecom, IT/IP networks and services.	Reporting
Security management	Certification Authority	Provides and requests new certificates.	Security
Security management	Network Element Access Control	Network Element Access Control manages and administers service users of Network Element(s). Centralized Network Element User Management enables users to log in to a network element with their own user account.	Security
Security management	User Management	Manages and administers users and user groups.	Security
Network administration	License Manager	Manages licenses for Nokia network elements and software.	Configuration

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Network administration	Software Asset Monitoring	Reports features usage for network elements and NetAct.	Reporting
Network administration	Software Manager	Enables downloading new software packages to network elements.	Configuration
Network administration	MSC Server Pool Monitor	Monitors MSC server pool distribution.	Monitoring
Network administration	TraceViewer	Supports network monitoring and troubleshooting.	Monitoring
NetAct administration	Adaptation Manager	Deploys adaptations.	Administration
NetAct administration	Dynamic Adaptation	Provides an interface for viewing and triggering the Dynamic Adaption process for network element.	Administration

Management systems are connected with underlying NEs through southbound interfaces. Collected data from southbound interfaces is utilized and processed further for monitoring, configuring, reporting and administrative and security purposes.

Fault Management – The fault management monitoring tools in NetAct Monitor can be used to manage alarms from various network elements and types, to perform root cause analysis, to troubleshoot faults that cause disruptions in network services, and to improve the quality of the network services for subscribers. The NetAct Monitor fault management system consists of an FM event collection engine, FM event correlation engine, FM adaptation fragments, mediation interfaces, and fault management monitoring tools. These modular FM tools can be found in the Tools menu in the Desktop.

Below figure shows end to end view of fault into NetAct and going to north bound umbrella fault management system

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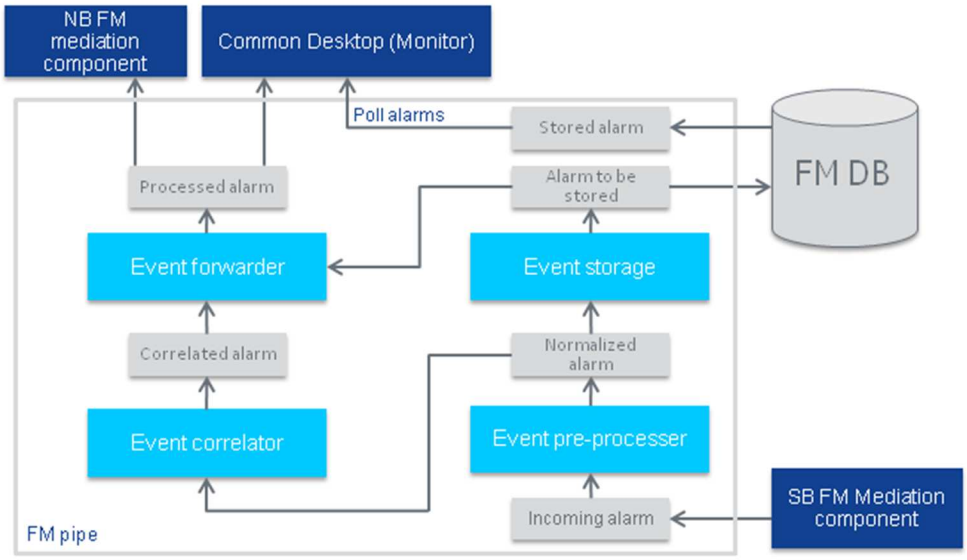

Figure 2: End to End fault view

Alarms are viewed in the monitor GUI which presents active alarms, historical alarm, alarm manual page etc

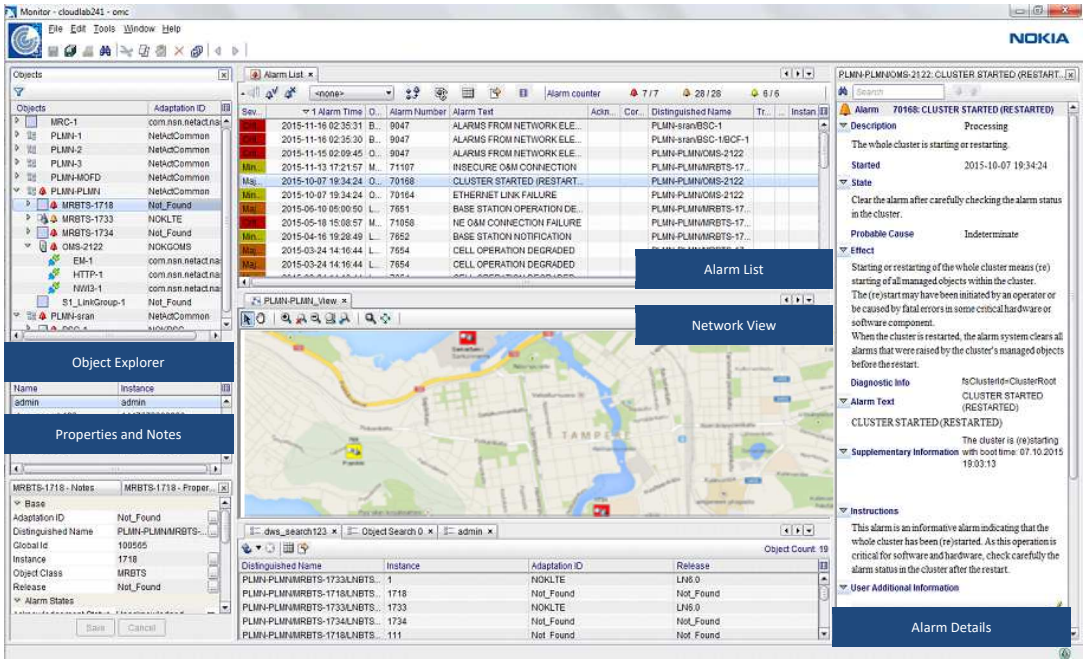

Figure 3: Monitor Page View

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Configuration Management – The purpose of configuration management is to model the telecom network structure (a.k.a. network topology) and manage domain-independent network parameters. Configuration management consists of the following applications: Common CM services, NE hardware management, NE software management, NE license management.

CM Event flow is shown below diagram

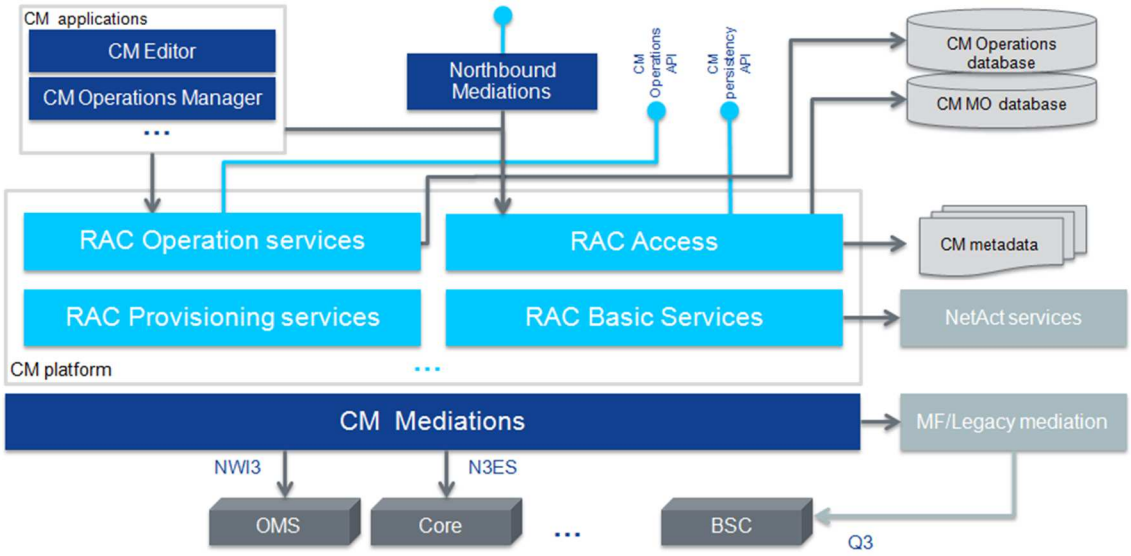

Figure 4: CM Event flow

Below figure shows the CM GUI

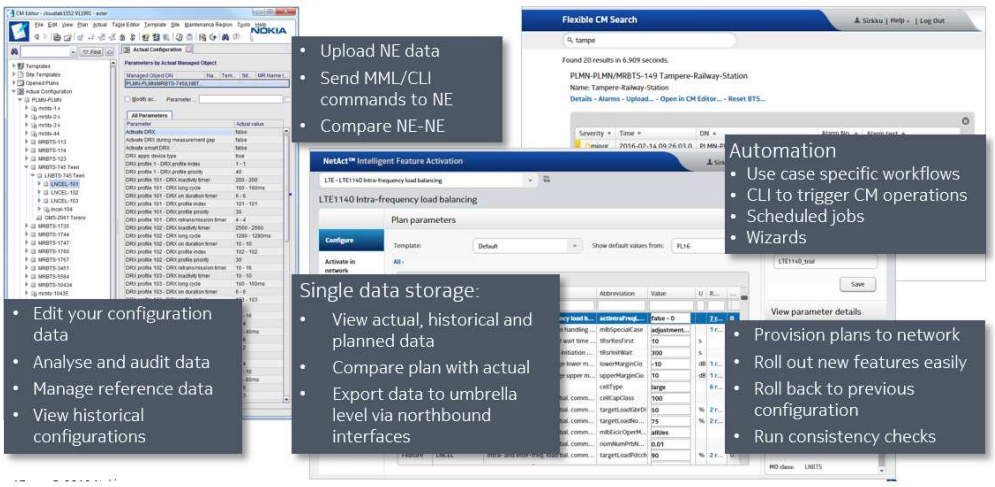

Figure 5: CM GUI

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Performance Management – The purpose of performance management is to collect & store measurements from telecom network and pre-& post-process measurements. Measurement collecting and storing applications are used to collect measurements from telecom network and store them in the measurement repository (a.k.a. PM database). Measurement collecting and storing is responsible to identify the origin of the measurement and attach it into network element instance and other adaptation release specific information. Performance management consists of the following features:

Measurement collecting and storing, Measurement processing, post-processing, visualization and administration.

Below diagram illustrates the E2E view of performance management event

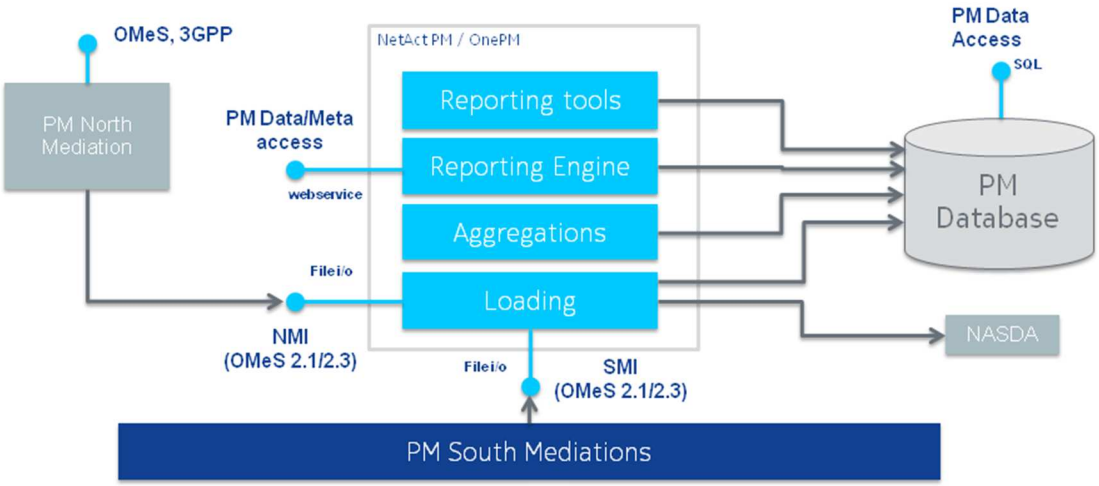

Figure 6: E2E PM Event Flow

Performance Manager+ GUI is a web based tool for regional cluster level to show different reports, design KPI and schedule reports

By using the Performance Manager+, you are able to:

1. create, edit, share and delete boards and KPIs.
2. access and visualize Telecom Vendor predefined content as well as user created content
3. drill in time and in network dimensions, as well as drill in KPIs.
4. create and manage scheduled jobs for boards, store the results in a NetAct server on pre-defined or configurable folders and, optionally, distribute them via e-mail in XLSX format.

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5. display FM information combined with the last occurrence of counters or KPIs managed objects.

Performance Manager+ has a licensing mechanism. Some functionalities may not be available depending on the acquired licenses.

Below diagram provides the Performance Manager+ GUI

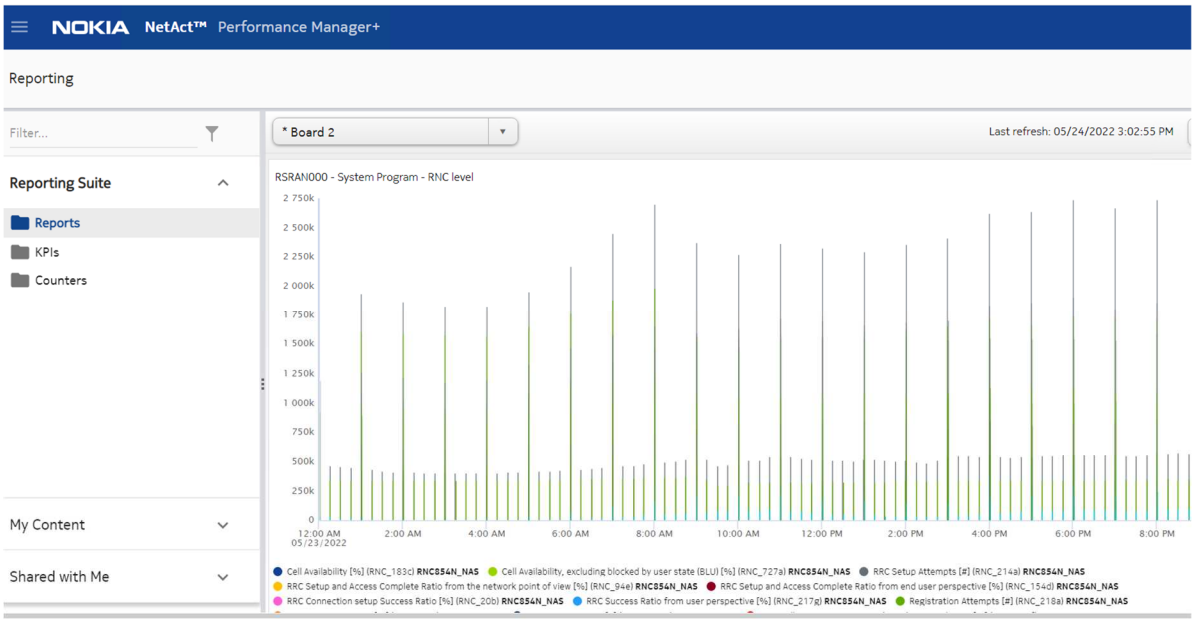

Figure 7: Performance Manager+ GUI

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Security Management - The purpose of security management is to manage security related information and help to enforce the security related policies. Security management consists of the following features: User account management, User group management, permission management, NE permission management, NE account management, NE access control, user activity monitoring, and license management

Security management covers all the aspects shown in the following figure:

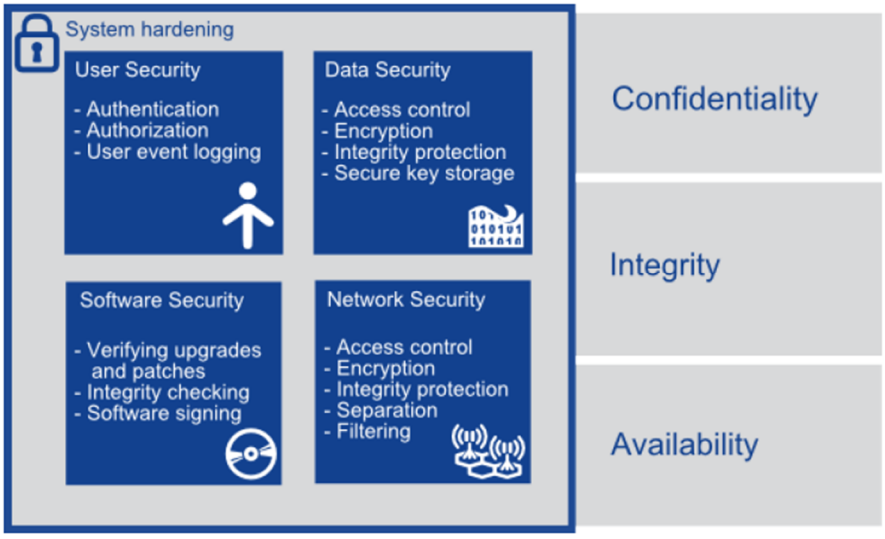

Figure 8: Security management

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2.3 NetAct Network Architecture

2.3.1 NetAct Cloud networking

NetAct Cloud networking is described in the following picture:

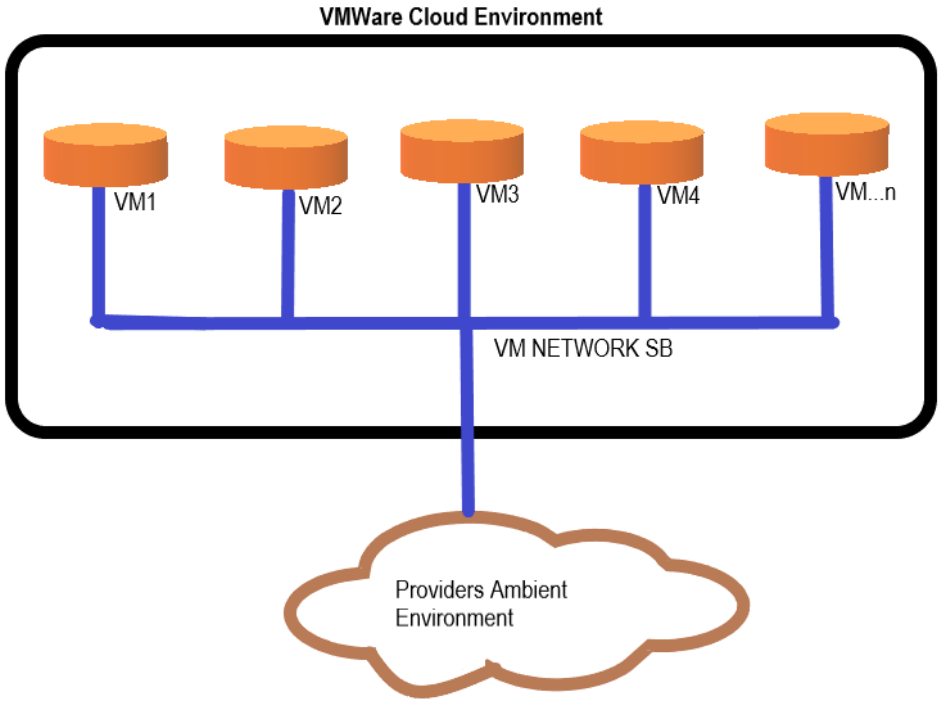

Figure 9: NetAct Cloud Network with NetAct router

NetAct Standard requires the following VLAN:

Southbound network, VM communication network towards Network Elements

NetAct Cloud uses fixed IP addresses for network interfaces of the virtual machines.

The following VLANs are created and managed by the Customer:

- Management network, dedicated for ESXi interfaces vmk0
- vMotion network, dedicated for High Availability and vMotion traffic

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2.4 Load balancing (LB) of NetAct Cloud

NetAct Cloud includes functionality to balance incoming network traffic from northbound interfaces (NBI) and southbound interfaces (SBI). This service is provided with a failover pair of virtual machines called LB-1 and LB-2 in the NetAct Cloud configuration. The functionality is provided with keepalived load balancer (earlier known as LVS, Linux Virtual Server) which is part of the Red Hat Enterprise Linux operating system used in virtual machines of NetAct Cloud.

2.5 NetAct Cloud Delivery

NetAct Cloud uses the NetAct software-only delivery model in which Telecom Vendor delivers NetAct software including the 3rd-party software and the operating system to a VMware data center. NetAct Cloud enables NetAct deployment in VMware data centers. NetAct Cloud has the following characteristics:

1. Similar to traditional NetAct, NetAct Cloud has three configurations: Small, Large and XXL.

2. The NetAct applications used for operating and monitoring the operator network have the same functionality in NetAct as in traditional NetAct.

3. The network element version support of NetAct Cloud aligns with the traditional NetAct.

4. NetAct Cloud supports two virtualization layers: OpenStack and VMware. NetAct Cloud capacity is guaranteed if the resource configuration at the operator is based on NetAct's reference configuration information for virtual infrastructure and hardware. Telecom Vendor provides the reference configuration, in addition to information on NetAct performance achieved using the reference environment.

5. As the NetAct Cloud delivery does not include virtualization layer and hardware, NetAct Cloud has no control of and cannot monitor virtual infrastructure or hardware. In the data center, the virtual infrastructure manager (VIM) is used instead.

The following figure illustrates the share of responsibilities between the operator and Telecom Vendor.

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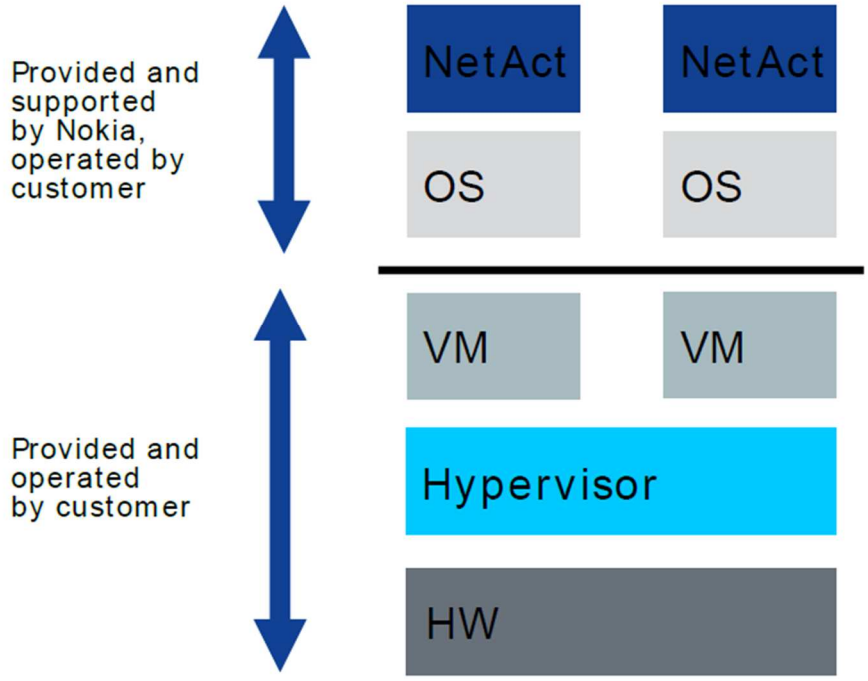

Figure 10: NetAct Cloud Network with NetAct router

2.6 High Availability

In a virtualized environment, the relationship between hardware and application instances is not one-to-one. To minimize the impact of hardware unavailability or unreachability, take the following aspects into account when planning the configuration.

- Design all traffic connections for primary and failover connections.
- There should be at least two host servers that can offer hardware resources (vCPU, RAM) to at least two of the biggest virtual machines (Eg: DB and WAS VMs).
- Design server resources with a maximum of 20% hardware oversubscription if one host server fails. The remaining servers must offer the required RAM resources to all VMs.

High availability of the VMware platforms and VMs is to be ensured by the customer. The NetAct services hosted inside the VMs are monitored by the NetAct service monitoring functionality.

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2.6.1 VMware high availability

The virtual infrastructure ensures that virtual machines are always highly available. High availability is provided by the ESXi servers and the management functionality. VMware vCenter, provides the intelligence on where to restart the virtual machines based on available resources within HW resource pool.

2.6.2 NetAct Virtual Manager (vManager)

In software only deliveries, Virtual Manager (vManager) access to vCenter is disabled. Hence, vManager cannot do any VM level recovery. It can only indicate service failures via alarms.

2.6.3 NetAct Service Monitoring

High availability for the NetAct service inside a virtual machine is managed by Service monitoring. Service monitoring ensures that services are always highly available. Service monitoring can monitor/stop/start or restart a service in the local virtual machine independent of the Virtual Manager. Service monitoring is not able to restart the virtual machine itself. Service redundancy is ensured via DRS rules that state that redundant services do not co-locate in the same ESXi host at any point of time.

2.6.4 DRS rules

Service redundancy is ensured via DRS rules that state that redundant services do not co-locate in the same ESXi host at any point of time.

2.7 Site Details

Below table provides the site details where NetAct will be installed for production.

Environment Type	NetAct Config	Site	Functionality
Production	Small	standalone	Standard (Cloud)

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2.7.1 Production environment computing resources

Below table gives the computing resources required for NetAct VNF

VM	OS	Type	vCPU	vRAM	Memory Reservation	VMDK	SWAP	Datastore	Recommended
VM1	RHEL8	Admin Server	4	4	0	350	4	infraVMDisk	egerZeroedThick
VM3	RHEL8	DNS	4	4	4	41	0	VMGuestDisk1	egerZeroedThick
VM4	RHEL8	DB	6	40	33	91	7	VMGuestDisk2	egerZeroedThick
VM5	RHEL8	NFS/LDAP	3	5	5	46	0	VMGuestDisk3	egerZeroedThick
VM6	RHEL8	LB-1	2	2	0	31	2	VMGuestDisk1	egerZeroedThick
VM7	RHEL8	SELFMON	2	3	0	31	3	VMGuestDisk2	egerZeroedThick
VM8	RHEL8	NBI3GC	3	6	0	61	6	VMGuestDisk3	egerZeroedThick
VM9	RHEL8	NWI3	3	4	0	56	4	VMGuestDisk1	egerZeroedThick
VM10	RHEL8	Q3	3	5	0	71	5	VMGuestDisk2	egerZeroedThick
VM11	RHEL8	LB-2	2	4	0	31	4	VMGuestDisk3	egerZeroedThick
VM12	RHEL8	XOH	6	6	0	101	6	VMGuestDisk1	egerZeroedThick
VM13	RHEL8	JBI-NBI	2	5	0	51	5	VMGuestDisk2	egerZeroedThick
VM14	RHEL8	COMMON	5	12	0	56	12	VMGuestDisk3	egerZeroedThick
VM15	RHEL8	FM-PIPE	3	5	0	41	5	VMGuestDisk1	egerZeroedThick
VM16	RHEL8	WAS	8	32	32	136	0	VMGuestDisk2	egerZeroedThick
VM17	RHEL8	WAS	8	32	32	136	0	VMGuestDisk3	egerZeroedThick
VM18	WS 2019 STD	NMS DC	4	4	0	100	4	VMGuestDisk1	egerZeroedThick
VM19	WS 2019 STD	NMS VDA	4	16	0	100	16	VMGuestDisk2	egerZeroedThick
VM70	WS 2019 STD	NMS CTXDC	4	14	0	120	14	VMGuestDisk3	egerZeroedThick
VM66	RHEL8	PM Backend	6	6	0	56	6	VMGuestDisk3	egerZeroedThick
VM67	RHEL8	PM Backend	6	6	0	56	6	VMGuestDisk1	egerZeroedThick
VM85	RHEL8	IHS-1	3	3	0	41	3	VMGuestDisk3	egerZeroedThick
VM86	RHEL8	IHS-2	3	3	0	41	3	VMGuestDisk3	egerZeroedThick
VM44	RHEL8	T&P	4	16	0	71	16	VMGuestDisk1	egerZeroedThick
VM47	WS 2019 STD	NMS AS	4	16	0	100	16	VMGuestDisk1	egerZeroedThick
VM56	RHEL8	SLC	3	8	0	121	8	VMGuestDisk2	egerZeroedThick
VM57	RHEL8	SLC	3	8	0	121	8	VMGuestDisk3	egerZeroedThick
VM73	RHEL8	CLS DB	2	4	0	41	4	VMGuestDisk1	egerZeroedThick
VM74	RHEL8	CLS FE	2	4	0	31	4	VMGuestDisk2	egerZeroedThick
VM75	RHEL8	CLS BE	4	4	0	31	4	VMGuestDisk3	egerZeroedThick

1pCPU = 2vCPU
1 vRAM = 1GB vRAM
1 VMDK = 1GB VMDK

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2.7.2 Production environment IP plan

VM Name	IP	Hostname
Networking	10.31.28.1	**reserved**
Networking	10.31.28.2	**reserved**
Networking	10.31.28.3	**reserved**
Networking	10.31.28.4	**reserved**
ZKWNAADMN	10.31.28.5	zkwnavm1
ZKWNADNS	10.31.28.6	zkwnavm3
ZKWNADB	10.31.28.7	zkwnavm4
ZKWNANFS	10.31.28.8	zkwnavm5
ZKWNALB1	10.31.28.9	zkwnavm6
ZKWNASELFMON	10.31.28.10	zkwnavm7
ZKWNANBI3GC	10.31.28.11	zkwnavm8
ZKWNANWI3	10.31.28.12	zkwnavm9
ZKWNAQ3	10.31.28.13	zkwnavm10
ZKWNALB2	10.31.28.14	zkwnamv11
ZKWNAXOH	10.31.28.15	zkwnavm12
ZKWNAJBINBI	10.31.28.16	zkwnavm13
ZKWNACOMMON	10.31.28.17	zkwnavm14
ZKWNAFMPIPE	10.31.28.18	zkwnavm15
ZKWNAWAS1	10.31.28.19	zkwnavm16
ZKWNAWAS2	10.31.28.20	zkwnavm17
ZKWNANMSDC	10.31.28.21	zkwnanmsdc
ZKWNANMSVDA	10.31.28.22	zkwnanmsvda
ZKWNANMSCTXDC	10.31.28.23	zkwnanmsctxdc
ZKWNAPMBKND1	10.31.28.24	zkwnavm66
ZKWNAPMBKND2	10.31.28.25	zkwnavm67
ZKWNAIHS1	10.31.28.26	zkwnavm85
ZKWNAIHS2	10.31.28.27	zkwnavm86
ZKWNATP	10.31.28.28	zkwnavm44
ZKWNANMSVDAAS	10.31.28.29	zkwnanmsvdaas
ZKWNACLSDB	10.31.28.32	zkwnavm73
ZKWNACLSFE	10.31.28.33	zkwnavm74
ZKWNACLSBE	10.31.28.34	zkwnavm75
LB Web Page IP	10.31.28.40	https://login.rc01netact.kw.zain.com/
JBI IP	10.31.28.41	
Gateway	10.31.28.126	

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2.7.3 Production environment Naming convention

All the VMs will be named according to the convention below:

VM	FQDN
ZKWNAADMN	zkwnavm1.rc01netact.kw.zain.com
ZKWNADNS	zkwnavm3.rc01netact.kw.zain.com
ZKWNADB	zkwnavm4.rc01netact.kw.zain.com
ZKWNANFS	zkwnavm5.rc01netact.kw.zain.com
ZKWNALB1	zkwnavm6.rc01netact.kw.zain.com
ZKWNASELFMON	zkwnavm7.rc01netact.kw.zain.com
ZKWNANBI3GC	zkwnavm8.rc01netact.kw.zain.com
ZKWNANWI3	zkwnavm9.rc01netact.kw.zain.com
ZKWNAQ3	zkwnavm10.rc01netact.kw.zain.com
ZKWNALB2	zkwnamv11.rc01netact.kw.zain.com
ZKWNAXOH	zkwnavm12.rc01netact.kw.zain.com
ZKWNAJBINBI	zkwnavm13.rc01netact.kw.zain.com
ZKWNACOMMON	zkwnavm14.rc01netact.kw.zain.com
ZKWNAFMPIPE	zkwnavm15.rc01netact.kw.zain.com
ZKWNAWAS1	zkwnavm16.rc01netact.kw.zain.com
ZKWNAWAS2	zkwnavm17.rc01netact.kw.zain.com
ZKWNANMSDC	zkwnanmsdc.win.rc01netact.kw.zain.com
ZKWNANMSVDA	zkwnanmsvda.win.rc01netact.kw.zain.com
ZKWNANMSCTXDC	zkwnanmsctxdc.win.rc01netact.kw.zain.com
ZKWNAPMBKND1	zkwnavm66.rc01netact.kw.zain.com
ZKWNAPMBKND2	zkwnavm67.rc01netact.kw.zain.com
ZKWNAIHS1	zkwnavm85.rc01netact.kw.zain.com
ZKWNAIHS2	zkwnavm86.rc01netact.kw.zain.com
ZKWNATP	zkwnavm44.rc01netact.kw.zain.com
ZKWNANMSVDAAS	zkwnanmsvdaas.win.rc01netact.kw.zain.com
ZKWNACLSDB	zkwnavm73.rc01netact.kw.zain.com
ZKWNACLSFE	zkwnavm74.rc01netact.kw.zain.com
ZKWNACLSBE	zkwnavm75.rc01netact.kw.zain.com
LB Web Page IP	login.rc01netact.kw.zain.com
JBI IP	jbilb.rc01netact.kw.zain.com

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3 Hardware requirements

The following characteristic are required from the production cloud infrastructure environment.

3.1 CPU

All NetAct virtual machines (VMs) support the following hardware oversubscription rule with the reference Intel processors:

- two virtual cores to one physical core: 1pCPU = 2vCPU

This oversubscription rule requires that BIOS CPU hyper threading is ENABLED in the servers. CPU reservations on the VMs are not required, allowed, or supported. A reasonable CPU resource utilization target for a host server is 80%.

3.1.1 Total CPU requirements

The resource requirements for NetAct 22 Cloud (VMWare) release are listed below.

NetAct installation/resource	vCPU
Small	**145**

3.2 RAM

Memory must be mapped as follows:

- 1 GB of VM vRAM to 1 GB of physical RAM

Memory oversubscription is not recommended with any NetAct product.

Note The sum of the virtual machines' vRAM may not exceed the total physical memory on the physical servers.

It is recommended to reserve memory for based on Memory Reservations

3.2.1 Total RAM requirements

The resource requirements for NetAct 22 Cloud (VMWare) release are listed below.

NetAct installation/resource	vRAM [GB]
Small	**370**

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3.3 Disk space

In external SAN storages, 1 GB of VM vDisk should be mapped to 1 GB of physical storage.

Storage thin provisioning is recommended.

Any other forms of storage oversubscription are not recommended.

The NetAct file system defines disk names and the usage of specific disks for different needs. The current disk configurations for NetAct cluster are presented below.

Disk name	Notes	Recommended
DBArc	Datastore for Oracle Archive files	Thick
Backup	Datastore for Backup [DB and NFS]	Thick
DBData	Datastore for Oracle Database files	egerZeroedThick
NFSGlobal	Datastore for NetAct global file system	egerZeroedThick
DBRedo	Datastore for Oracle Redo files	egerZeroedThick
PMDatastore	Datastore for performance management	egerZeroedThick
VMGuestDisk	Datastore for virtual machines	egerZeroedThick
Customer	Datastore for customer-specific needs	egerZeroedThick
infraVMDisk	Datastore for Administration server	egerZeroedThick
FB (Optional)	Datastore for Flash backup	

3.3.1 Space requirements

Space requirements are presented below.

Name	Size GB
VMGuestDisk	2285
DBRedo	66
DBData	750
DBArc	1125
NFSGlobal	270
Customer	300
PMDatastore	150
infraVMDisk	700
Backup	3050

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3.3.2 Backup space requirements

Space requirements for backups are presented below.

NetAct configuration	Backup [GB]
Small	5335 [DB, NFS and VM image backups]

3.4 Networking (DCN)

The VLANs used by NetAct are listed below:

- Southbound network, VM communication network towards network elements

Requirements for NetAct data communications are presented below:

Layer 2 requirements	
VLANs or virtual wires	VM_Network_SB
Layer 2 multicast	NetAct VLANs shall support multicast forwarding within VLAN
MTU size	Infrastructure needs to support minimum 1500 bytes MTU for NetAct virtual machines. **Note** This is a mandatory requirement.

3.4.1 Number of IP addresses required

NetAct requires fixed IP addresses for virtual machines.

- Administration Server needs an IP address
- Each virtual machine needs an IP address
- NetAct load balancer needs 2 virtual IP addresses

When allocating the IP subnet, it is always recommended that at least 25 % of the address space is reserved for future expansion and NetAct System Configuration changes from Small to Production Configuration (Large, XL, XXL), it is recommended to have /25 IP subnet.

The IP address requirements for NetAct 22 Cloud (Small configuration) release are listed below.

NetAct configuration	VM IP addresses
Small	31

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4 Third-party software versions used in NetAct

The versions of third-party software and services used in NetAct are listed below.

Third-party software or service	Version
Red Hat Linux Enterprise	8.4
389 Directory Server	1.4
EsperHA	3.5.0
ICA Connection Server	Citrix Virtual Apps and Desktops (CVAD) 1912 LTSR
Roguewave JViews	8.8
Java Runtime Environment (JRE)	JRE 8 Update 331
OpenJDK	1.8.0.302
Oracle Enterprise Edition (EE) RDBMS	19c
Oracle Client	19c
ServiceMix	3.4
SOCKS Proxy	Dante 1.4
WebSphere Application Server Network Deployment (ND)	9.0.5.10
Windows Server	2019

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5 VMWare infrastructure requirements

The following characteristic are required from the VMWare cloud infrastructure.

5.1 Deployment

NetAct will be deployed in the Customer VMware Cloud environment

5.1.1 Prerequisites

Following prerequisites are mandatory for NetAct deployment:

- VMware Infrastructure must be in vSphare version 7.
- The number and configuration of virtual machines is in accordance with the requirements specified in this document (vCPU, vRAM, and VMDK).
- Data stores are created in accordance with the requirements specified in this document.
- SCSI Controller types and IDs are based on requirements specified in this document.
- Oracle DB VM and NFS Server VM virtual disk configuration is in accordance with the requirements specified in this document.
- Distributed Resource Scheduler (DRS, anti-affinity) rules are created in accordance with requirements specified in this document.
- VM root disks are divided to minimum of two data stores.
- VMs are connected to networks in accordance with the requirements specified in this document.

5.1.2 Overview

The installation utilizes the Administration Server. The figure below shows an overview of the different phases of the installation.

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Figure 11: Deployment Phases

5.2 VMWare features used by NetAct

- Hypervisor
- High Availability
- vMotion
- Distributed Resource Scheduler

5.3 Resource planning

Values in resource plan are based on extensive performance verification and recommendations from VMware consultants.

If NetAct Cloud does not get resource allocations as in resource plan performance, capacity and stability of system cannot be guaranteed by Telecom Vendor.

5.4 VMWare parameters

5.4.1 SCSI Controller Type

SCSI controller type for all VMs must be VMware Paravirtual (aka PVSCSI). PVSCSI adapters are high-performance storage adapters that can result in greater throughput and lower CPU utilization. PVSCSI adapters are best for NetAct purposes since NetAct drives a very high amount of I/O throughput.

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5.4.2 Virtual Storage adapter

All virtual machines use SCSI controller ID 0 for vmguestdisks datastores.

Virtual machines with intense workloads such as DB and NFS, it is recommended to configure virtual storage adapter for each of the attached datastores.

Disk Name	SCSI ID	SCSI Controller ID
vmguestdisks	0	0
DB_arch	1	1
DB_redo	2	2
DB_data	3	3
DB_backup	8	0
db-fb_disk	5	1

Disk Name	SCSI ID	SCSI Controller ID
vmguestdisks	0	0
NFS_ global	4	1
NFS_home	5	2
NFS_backup	8	3
wasdumps_disk	6	1

Disk Name	SCSI ID	SCSI Controller ID
vmguestdisk	0	0
PMDatastore	1	1

Disk Name (FP, ADM, ISDK)	SCSI ID	SCSI Controller ID
vmguestdisk	0	0
adm_disk1	5	1
isdk_disk1	1	0

5.5 Virtual Disk Persistent Mode

All VM root disks, fast pass adm disks are in dependent mode. Oracle DB VM disks redo, arc, db and backup disks are in independent-persistent mode. NFS Server VM disks **NFS_home**, **NFS_global**, and **backup** are in **independent-persistent** mode.

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5.6 DRS Rules

Redundant services should not co-locate in the same ESXi host at any point of time (anti-affinity rules). DRS rules for small deployment is presented below.

NetAct Small

DRS rule name	DRS rule type	First VM	Second VM
LB-1 and LB-2	Separate Virtual Machines	vm6	vm11
LB-2 and Unify WAS-1	Separate Virtual Machines	vm11	vm16
ldap-1 and ldap-2	Separate Virtual Machines	vm3	vm5
dns-m and dns-s	Separate Virtual Machines	vm3	vm14
Unify PM backend-1	Separate Virtual Machines	vm66	vm67
Unify was-1	Separate Virtual Machines	vm16	vm17
NMgr Ad and NMgr Ad	Separate Virtual Machines	Vm18	vm46
IHS-1 and IHS-2	Separate Virtual Machines	vm85	vm86

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6 Network Element List

The following Network Elements will be integrated to NetAct.

S. No	NE Type	Version
1	AirScale BTS - 5G	5G21B ,22R1-5G , 22R3-SR
	Airscale BTS - SR	SRAN21B , 22R1-SR , 22R3-SR
	Airscale RNC (WCDMA22)	AirScale RNC FP21A, AirScale RNC FP21B, AirScale RNC FP21C and AirScale RNC FP22R1 AirScale RNC FP22R3 (planned)
	Flexi Zone (LTE/WCDMA)	WCDMA22 / FLF22R1-FZ 1.0

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7 Backup and restore

The VM image backup (root disk) will be managed by the customer backup system. NetAct Backuptool solution will be used for DB or NFS backup. Backuptool makes online and offline backups of Oracle DB data and NFS filesystem backups. Backuptool implements the usage of Oracle RMAN functionality to make consistent backups of Oracle DB data.

7.1 Oracle DB backups

Disk configuration related to Oracle DB backups is presented below.

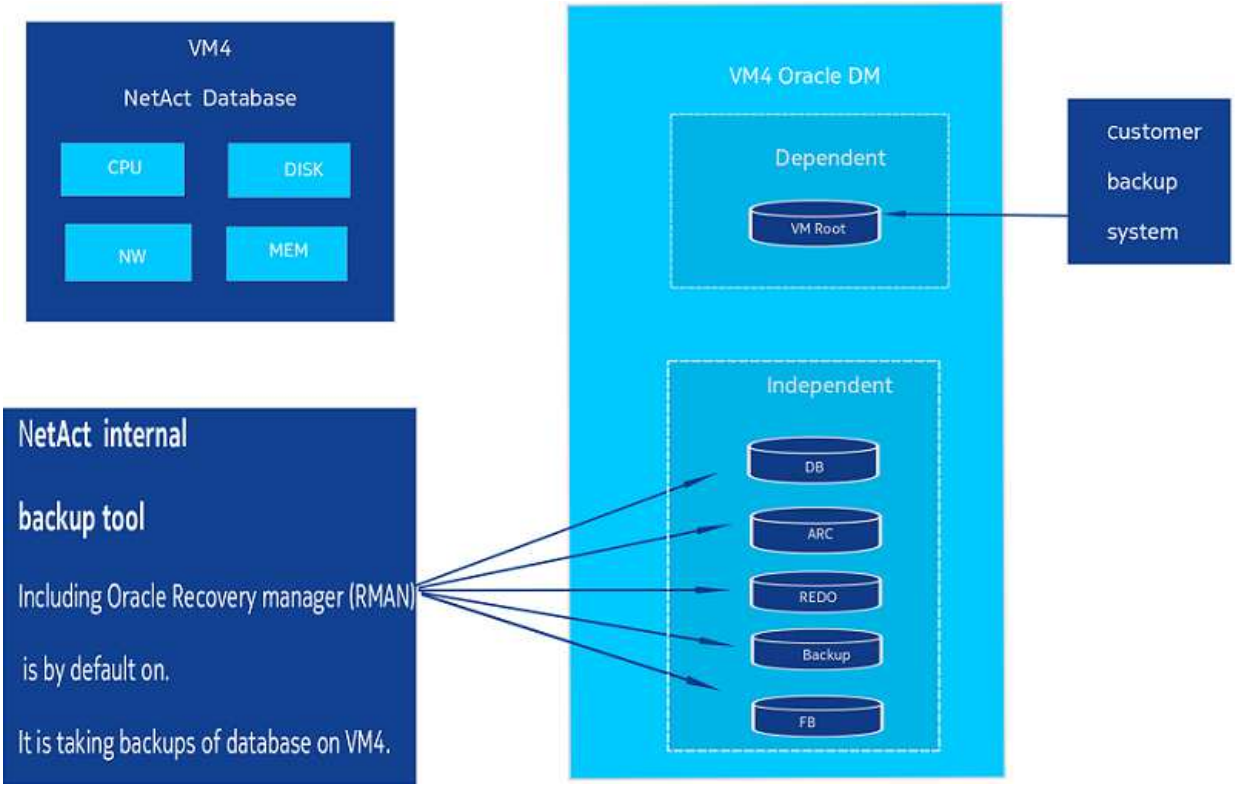

Figure 12: Oracle DB backups

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7.2 NFS Server backups

Disk configuration related to NFS Server backups is presented below.

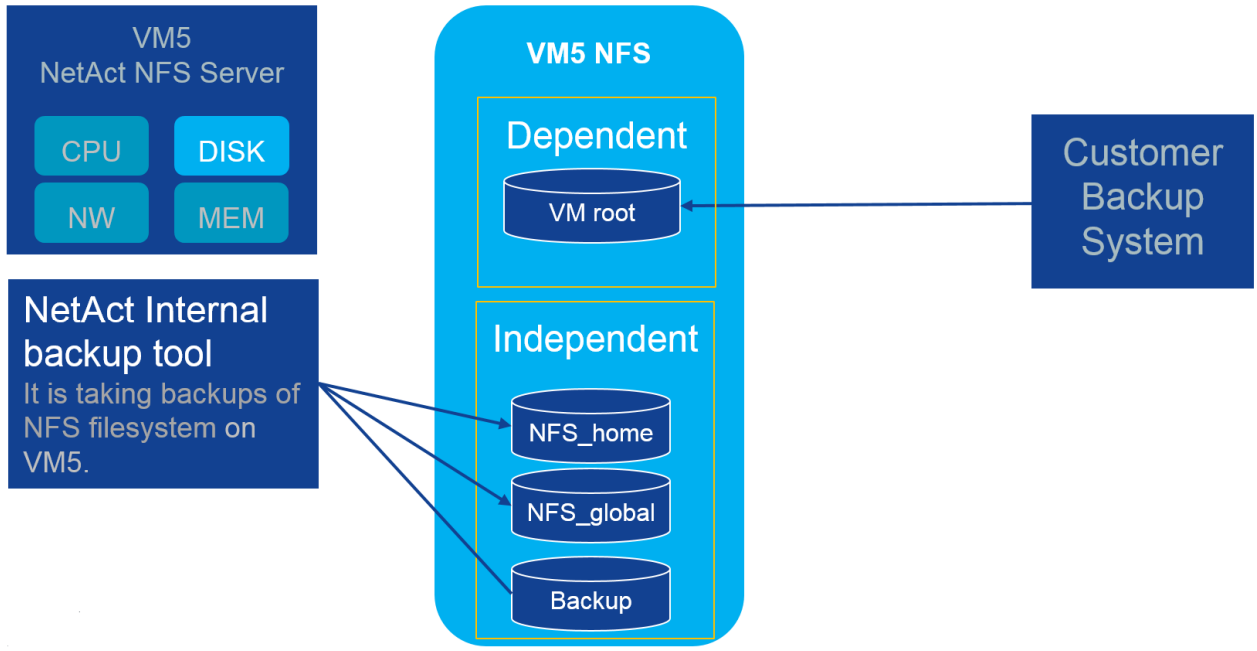

Figure 13: NFS backups

7.3 Backup recommendations

- Daily backups from NetAct file system and database are made by backuptool
- Weekly backup of VM image

Note	Making offline backups is recommended before major release upgrade, but they are **not mandatory** if online backups are made regularly.

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8 System self-monitoring

NetAct system self-monitoring consist of collecting Performance Management and Fault Management data from:

- Operating system and services
- Applications

NetAct self-monitoring functionality does not collect PM and FM data from virtual infrastructure.

- NetAct scope

- NetAct monitoring and alerting covers guest OS and services running within NetAct software
- These include monitoring of services which are critical for NetAct applications

- Cloud infrastructure provider’s scope

- Monitoring of all hardware which provides resources for NetAct
- Ensure resource availability for NetAct in line with reference configuration. Such resources may be compute (CPU/RAM), Networking, Storage (IOPS, bandwidth, latency)
- Ensure high availability

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9 Glossary

Acronym	Definition
FCAPS	Fault, Configuration, Administration, Performance and Security Management
FM	Fault Management
GUI	Graphical User Interface
HA	High Availability
NMS	Network Management System
LLD	Low Level Design
HLD	High Level Design
TSD	Technical Solution Description
HW	Hardware

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